## Concept Problems

**C1.** *Four Transformations Problem:* Figure 1-8l shows a pre-image function $f$ (dashed) and a transformed image function $g$ (solid). Dilations and translations were performed in both directions to get the graph for $g$. Figure out what the transformations were. Write an equation for $g(x)$ in terms of $f$. Let $f(x) = x^2$ with domain $-2 \le x \le 2$. Plot the graph of $g$ on your grapher. Does your grapher agree with the figure?

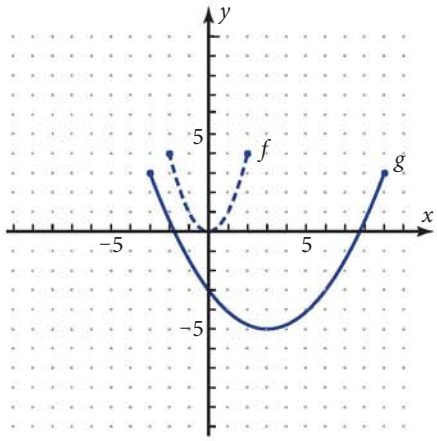


*Figure 1-8l*

**C2.** *Sine Function Problem:* If you enter $f_1(x) = \sin(x)$ into your grapher and plot the graph, the result resembles Figure 1-8m. (Your grapher should be in radian mode.) The function is called the **sine function** (pronounced "sign"), which you will study starting in Chapter 5.

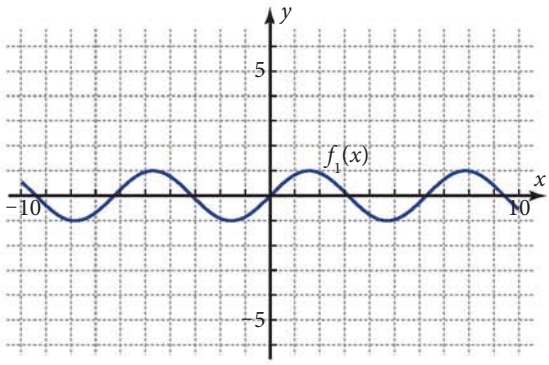


*Figure 1-8m*

**a.** The sine function is an example of a **periodic function.** Why do you think this name is given to the sine function?

**b.** The **period** of a periodic function is the difference in $x$-values from a point on the graph to the point where the graph first starts repeating itself. Approximately what does the period of the sine function seem to be?

**c.** Is the sine function an odd function, an even function, or neither? How can you tell?

**d.** On a copy of Figure 1-8m, sketch a vertical dilation of the sine function graph by a factor of 5. What is the equation of this transformed function? Check your answer by plotting the sine graph and the transformed image graph on the same screen.

**e.** Figure 1-8n shows a two-step transformation of the sine graph in Figure 1-8m. Name the two transformations. Write an equation for the transformed function, and check your answer by plotting both functions on your grapher.

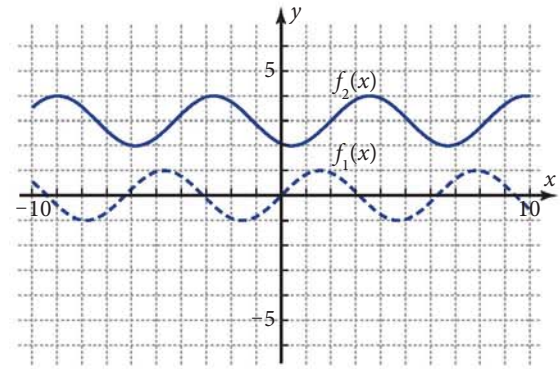


*Figure 1-8n*

**f.** Let $f(x) = \sin x$. What transformation would $g(x) = \sin\left(\frac{1}{2}x\right)$ be? Check your answer by plotting both functions on your grapher.